RELATION OF DENTAL ANXIETY AND MINDFULNESS: A COMPARISON OF PRE-HEALTH AND NON PRE-HEALTH STUDENTS

An Undergraduate Research Scholars Thesis

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ABSTRACT

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Understanding dental anxiety is important to gain insight on its origins and potential treatments. In this study, pre-health fields (medicine, dentistry, pharmacy, physician's assistant, and veterinary) are compared to those in other fields of study to show what types of college students are more anxious about visiting the dentist. Mindfulness is defined as "the state of being attentive to and aware of what is taking place in the present" (Brown & Ryan, 2003). Multiple studies show that having higher levels of mindfulness correlates with being less anxious (Greeson, 2009). Overall, this study will aid dentists to further understand the types of patients with more anxiety and could show that altering one's mindfulness could aid in overcoming that anxiety. To achieve these objectives, surveys administered include Corah's Dental Anxiety Scale and Dental Concerns assessment measure, and the Mindfulness Attention Awareness Scale (MAAS). The dental anxiety and mindfulness of pre-health and non pre-health students will be compared, and to see how these traits relate to each other. Participants were 128 volunteers from an undergraduate psychology course and from medical-related clubs enrolled at a large southwestern university. The participants were asked to indicate career aspirations in medical fields and to respond to the Corah Dental Anxiety scale-4 (4 items), to Clarke's and Rustvold's Dental Concerns assessment measure (DCAS), and to the Mindfulness Attention Awareness

scale (MAAS). The Corah Dental Anxiety Scale showed that pre-health students had less dental anxiety. Both the DCAS and the MAAS showed no significant difference. Convergent validity is found between the Corah Dental Anxiety Scale-4 and the DCAS. There was no significance difference between the dental anxiety scales and the MAAS.

DEDICATION

I dedicate this research to my parents who always push me to achieve everything I can. I never would have thought I would have found an interest in dentistry without their push to try things out of my comfort zone. I hope that my research makes them proud.

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NOMENCLATURE

- DAS-R- Dental Anxiety Scale-Revised
- DCAS- Dental Concerns assessment measure
- MAAS- Mindfulness Attention Awareness scale
- MBCT- Mindfulness Based Cognitive Therapy
- MSBR- Mindfulness Based Stress Reduction

SECTION I

INTRODUCTION

Dental anxiety affects many people. It is important to understand the populations of people who have more dental anxiety in order to gain insight on its origins and potential treatments. The objective of this research project is to investigate how Texas A&M students that are pre-health (pre-dental, pre-medical, pre-physician's assistant, pre-veterinarian, pre-pharmacy, or pre-nursing) differ from those in other fields in regards to their dental anxiety. This study will also relate these findings to the student's mindfulness. Multiple studies show that having higher levels of mindfulness correlates with being less anxious (Greeson, 2009). The relationship between the dental anxiety and mindfulness of pre-health and non pre-health students will be analyzed. Further knowledge into relation of dental anxiety and mindfulness could lead to increased use of mindfulness techniques to combat these issues.

Dental anxiety

Dental anxiety is defined as inordinate fear of dental treatment (Borland, 1962). Dental anxiety is a common issue. One study showed that "high dental fear was found to affect 204 per 1,000 people [and that] more than 66% acquired their fear in early childhood (Milgrom, Peter, Fiset, Melnick, & Weinstein, 1988). One study conducted by Skaret, Raadal, Berg, and Kvale, (1998) analyzed 18-year olds specifically, showing similar results, in that 19% of that population showed high dental anxiety. The following study will focus on dental anxiety in subjects similar in age: college students.

Fear of the dentist can lead to dental neglect, causing poorer oral health and even lower quality

of life in comparison to those who are less anxious. Armfield, Stewart, and Spencer (2007) describe a cycle in which dental fear leads to delayed visiting, thus to dental problems, and symptom-driven treatment, which thus leads to more dental fear. They found that those who had dental fear fell into this cycle, and in return had poorer oral health (Armfield, Stewart, & Spencer, 2007). Additionally, a study conducted by McGrath and Bendi (2004) analyzed the impact dental anxiety has on one's quality of life relating to their oral health. Using the Corah Dental Anxiety Scale and the oral health quality of life measure (OHQOL), it was found that those with high levels of dental anxiety were almost twice as likely to have a lower quality of life (McGrath & Bendi, 2004).

Many studies relate the origins of dental anxiety with previous dental and medical experiences. Cohen, Snyder, and Labelle (1982) employed Corah's Dental Anxiety Scale (DAS) and a 24-item questionnaire to assess subjects' previous experience with dentists. They found that negative attitudes towards dentists, having fewer personal preventative dental activities, and especially childhood experiences with dentists correlated with higher levels of dental anxiety (Locker, Shapiro & Liddell, 1996). As noted by the authors, the strong correlation with negative childhood dental experiences and dental anxiety shows the importance of "making childhood dental visits as pleasant as possible."

Humphris and King (2011) also noted that negative previous exposure leads to higher anxiety. They employed the Modified Dental Anxiety Scale (updated from the original DAS) and the Level of Exposure-Dental Experiences Questionnaire to assess the degree past distressing experience has on one's dental anxiety (Humphris & King, 2011). Notable negative experiences that lead to higher dental anxiety included "extreme helplessness during dental treatment, lack of understanding of the dentists, and extreme embarrassment during dental treatment" (Humphris &

King, 2011). Also noted that the majority of previous experiences studied that lead to dental anxiety was of dental origin, rather than unrelated trauma that can cause anxiety, such as a natural disaster or a violent crime (Humphris & King, 2011). Overall, these two studies show that the origin of dental anxiety can be studied from examining subjects' previous experiences and views about visiting the dentist.

Other studies focus on relating patient traits to dental anxiety, such as gender, age, and socioeconomic status. This type of analysis into patients' traits, in this case, their field of study, will be the focus of this research, rather than their previous experiences with dentists. Appukuttan, Devapriya, Subramanian, Tadepalli, and Damodaran (2015), employed the Modified Dental Anxiety Scale to assess various sociodemographic variables including gender, age, education level, occupation, and financial stability (Appukuttan et al, 2015). Findings showed that females, younger individuals, and those who were undereducated, unemployed, and financially dependent were all more anxious (Appukuttan et al, 2015). In general, this study shows that certain populations are more anxious about the dentist.

In another study, Egbor and Akpata (2014) also analyzed sociodemographic traits using the Corah Dental Anxiety Scale-Revised (DAS-R), specifically on patients getting a tooth extraction, a more significant procedure versus a simple check-up. These findings showed that the females, those in rural communities, those with lower education, and those who were not married had higher levels of anxiety. These two studies, in contrast to those that focus mainly on previous dental experience, show a different perspective of how dental anxiety can be assessed in a population.

The subject characteristics that will be analyzed will be based on their field of study: pre-health

students (pre-dental, pre-medical, pre-physician's assistant, pre-veterinarian, pre-pharmacy, or pre-nursing) will be compared to those who are not aspiring to enter any one of those fields. One of the surveys administered to the subjects consists of two yes or no questions: has the subject ever had previous dental work, and an indication of their field of study. If the subject has not had dental work, their responses will not be used.

Understanding the types of people who have more dental anxiety can be used to further find potential treatments. Jovanović-Medojević, Nešković, & Medojević (2015) analyzed the reports and studies on ways to treat dental anxiety. They mainly discuss the importance of a trusting patient-practitioner relationship to combat dental anxiety; the dentist is advised to understand of patient-specific concerns, be empathetic and friendly, and include detailed explanations of procedures (Jovanović-Medojević, Nešković, & Medojević, 2015). They also cite that the dentist's office environment can have influence on anxiety, such as including certain relaxing visual and auditory stimuli (Jovanović-Medojević, Nešković, & Medojević, 2015). Other therapies discussed include drug therapy, hypnosis, acupuncture, and breathing exercises (Jovanović-Medojević, Nešković, & Medojević, 2015). These treatments have variable success, generally depending on the specific patient and their level of dental anxiety (Jovanović-Medojević, Nešković, & Medojević 2015).

This study will employ the Corah Dental Anxiety Scale-Revised (DAS-R). The original 1969 version of the Corah Dental Anxiety Scale (DAS) was shown to be a reliable instrument of measuring dental anxiety (Corah 1969). The four items ask about how one feels about dental visits and procedures, with answer choices from "not anxious" to "extremely anxious," with total scores ranging from 4 to 20 (Corah 1969). Because of its high reliability and validity of predicting dental anxiety, the DAS, and its modified versions have been used in a vast number of

studies, including many previously mentioned. The Corah Dental Anxiety Scale has been updated multiple times; specifically it was updated in 1994 to include modern dental practices and language (Ronis, Hansen, & Antonakos, 1995). Ronis, Hansen, and Antonakos (1995) analyzed the equivalency of the two scales, and found a .98 correlation, showing that the updated DAS-R can be used if more current language is preferred.

The revised Clarke and Rustvold Dental Concerns Assessment (DCAS) (1998) will also be employed. This 26-item questionnaire includes various procedures and issues that can arise at the dentist, including "root canal treatment," "the sound or feel of scraping during teeth cleaning," and "the cost of the dental treatment [the subject] may need" (Clarke & Rustvold, 1998). The subject rates the concern from 1 (Low), 2 (Moderate), 3 (High), and 4 (Don't Know) (Clarke & Rustvold, 1998). This survey will add more items in addition to the DAS-R to ensure higher validity of measuring the subjects' dental anxiety. In addition to this study's aims, the comparability of the DAS-R and the DCAS in their ability to assess dental anxiety will be assessed.

In this study, students in pre-health fields (pre-dental, pre-medical, pre-physician's assistant, pre-veterinarian, pre-pharmacy, or pre-nursing) will be compared to those in other areas. A similar study by Storjord, Teodorsen, Bergdahl, and Johnsen (2014) revealed that students who are in dental school were less anxious than psychology and biology students. They cite that exposure, environmental habituation, and increased knowledge of dental procedures gained during school account for the lower anxiety in pre-dental students (Storjord, Teodorsen, Bergdahl, and Johnsen, 2014). The following analysis will more expansive, including more fields of healthcare. Those interested in the healthcare fields are expecting to be exposed to medical procedures, including many dental-related ones such as injections, as well as understanding that their patients will

experience pain and being uncomfortable. Thus, it is hypothesized that pre-health students will score as less anxious on the DAS-R and the DCAS compared to the non-pre-health students.

Mindfulness

This study will also analyze how pre-health students differ from their peers in their levels of mindfulness. Mindfulness is defined as "the state of being attentive to and aware of what is taking place in the present" (Brown & Ryan, 2003). The concept of mindfulness has is origins in ancient Buddhism. The Buddhist concept of vipassana or "insight" is a form of meditation in which one focuses on their present state, focusing on breathing (Kirmayer, 2015). Jon Kabat-Zinn, who is considered the father of modern mindfulness practice, applies Buddhist theory in his stress reduction program, Mindfulness Based Stress Reduction (MBSR) (Kabat-Zinn, 2003b). Kabat-Zinn has been a chief investigator on mindfulness-based therapies, since his opening of the Stress Reduction Clinic at the University of Massachusetts in the 1970's and his development of MBSR in the 1990's. The aims of this therapy are to train people to center on the present moment or task, while non-judgmentally evaluating thoughts or feelings that arise, in order to promote higher well-being (Kabat-Zinn, 2003a). Additionaly, Seagal, Williams, and Teasdale (2002) developed from MSBR a therapy called Mindfulness Based Cognitive Therapy (MBCT) to specifically help those suffering from depression. These two most recognized forms of mindfulness based therapy generally are 8 week group-programs where patients are taught how to decrease hindering thoughts of past implications or future problems, while learning to become aware of their present thoughts, feelings, and body sensations (Kabat-Zinn, 2003b), (Seagal, Williams, Teasdale, 2002). Mindfulness-based interventions such as MBSR and MBCT are rapidly increasing in use and are continually being evaluated for their effectiveness for many

different psychological issues, including pain, heart disease, sleep disorders, and everyday stressors (Grossman, Niemann, Schmidt, & Walach, 2004).

The following study will evaluate subjects' level of mindfulness and their dental anxiety. Gresson (2009) conducted a survey of 52 different works from 2003-2008 that related mindfulness to anxiety, as well as overall mental and physical health; mindfulness was thus related to impact on the mind, the brain, the body, and behavior. In terms of anxiety specifically, this review of the literature showed that having higher levels of mindfulness leads to significantly lower anxiety (Greeson, 2009). Kabat-Zinn's MSBR specifically has been shown to help people with various anxiety-related disorders (Grossman, Niemann, Schmidt, & Walach, 2004).

Because this study will relate mindfulness in terms of dentistry, it is important to understand the link that mindfulness has to the overall medical field. Kabat-Zinn (2005), from his decades is his Stress Reduction Clinic, discusses that those who participate in mindfulness interventions have fewer hospital visits and medical problems. Additionally, Brown and Ryan (2003) employed a Kabat-Zinn MBSR program to test how mindfulness helps cancer patients' emotional and mental health. They found that increasing mindfulness in turn lead to a significant decrease in stress, regarding anticipating negative future implications that cancer can bring (Brown and Ryan, 2003). This specific analysis shows that being mindful can impact one's view of their medical conditions and experiences. Lengacher (2009) also ran a study with cancer patients; in contrast to those studied by Brown and Ryan, these subjects were those who had been ridden of their cancer. They also underwent a MSBR program to help combat issues that arise following cancer treatment, including fear of recurrence of symptoms and future hospitalizations (Lengacher, 2009). It was found that by increasing their mindfulness, the subjects experienced reduction in

this specific anxiety, as well as attaining lower stress and higher quality of life (Lengacher,2009). This study shows that increasing one's level of mindfulness can reduce anxiety about future medical problems, and specifically anxiety about a medical treatment. This brief review of how mindfulness can have an impact on people's medical experiences relates to this study in that those with dental anxiety could benefit from being more mindful.

Despite the rapid gains mindfulness has made, the use of mindfulness as a treatment is still relatively new in the psychology field, and thus can be considered controversial. Baer (2003) points out various issues that mindfulness can have in the experimental setting. This meta-analysis of discusses that many studies evaluating the effectiveness of mindfulness have no control groups and have too small sample sizes (Baer, 2003). Also pointed out is that typical mindfulness-based therapies lack of concise methodology; more concise and operational studies must be taken in order to truly know if mindfulness can benefit people with certain ailments (Baer, 2003). Bishop (2002) also points out that because of these methodological flaws as well that mindfulness as treatment for specific diseases; the supposed effectiveness of this therapy can be challenged. A review of these critique from Kabat-Zinn (2003a) somewhat agrees with both Baer and Bishop, in that mindfulness studies on their effectiveness are under-researched and therefore not foolproof; however, he does point out that the increase in study has lead to more information on its therapeutic benefit. These critiques overall point out that even though mindfulness has made great strides in psychology, mindfulness can be misunderstood, and is also understudied; many medical issues, including dental anxiety, have not been evaluated in how mindfulness can affect their course. The extensive treatment analysis by Jovanović-Medojević, Nešković, Medojević (2015) did not mention mindfulness as a tool for combating dental anxiety.

Perhaps if a link is found, further research could show increasing one's mindfulness can be used for battling this particular anxiety.

To measure subjects' mindfulness, the Brown and Ryan (2003) Mindfulness Attention Awareness Scale (MAAS) will be used. This 15-item scale includes statements of experiences can characterize how aware one is of their surroundings and experiences, such as "I rush through activities without really being attentive to them" and "I snack with out being aware that I am eating." Subjects then circle the number corresponding to the frequency they experience that statement on a 1-6 scale, 1 being "almost always" and 6 being "almost never." This scale has been shown to reliable and valid in terms of measuring mindfulness (Brown & Ryan, 2003).

The objective of this research project is to investigate how Texas A&M students that are pre-health (pre-dental, pre-medical, pre-physician's assistant, pre-veterinarian, pre-pharmacy, or pre-nursing) differ in their level of dental anxiety compared to those in other fields. This study will also relate these findings to the student's mindfulness. Overall, we will find differences between the dental anxiety and mindfulness of pre-health and non pre-health students, and to see how these differences relate to each other. To achieve this objective, we aim to administer questionnaires that encompass these aims, including a demographics survey, the DAS-R, and the MAAS. Overall, this study will allow dentists to further understand the types of patients with more anxiety and could show that altering one's mindfulness could aid in overcoming that anxiety.

SECTION II

METHODS

Participants consisted of 128 volunteers enrolled at a large southwestern university. One set of participants came from an undergraduate psychology course at Texas A&M. Other participants were assembled from their involvement in pre-health organizations on campus, including the Pre-Medical, Pre-Dental, Pre-Veterinary, Pre-Physician's Assistant, and Pre-Pharmacy societies. The participants were asked to indicate career aspirations in medical fields (medicine, dentistry, pharmacy, physician's assistant, and veterinary) and to respond to the Corah Dental Anxiety scale-4 (4 items), to Clark's and Rustvold's Dental Concerns assessment measure (DCAS), and to the Mindfulness Attention Awareness scale (MAAS).

SECTION III

RESULTS

SAS procedures were employed in order to compare those participants having medical career ambitions to those with no such plans. A Manova (Wilks' λ $F_{(3, 123)}$=2.74, p<.05) revealed that those planning medical careers scored significantly lower on the Corah Dental Anxiety measure (MEAN=7.36, SE=.39) than did those with no such career goals (MEAN=8.62, SE=3.26).

No such significant differences were observed for the DCAS and the MAAS measures. A somewhat parallel Multiple Regression Analysis revealed that the Clarke and Rustvold Dental Anxiety measure is a significant predictor of involvement group ($F_{(3, 23)}$=2.74, p<.04, β=.31).

Multiple Regression Analyses were also employed in order to determine the relationship between Corah Dental Anxiety Scale-4 and the Clarke and Rustvold Concerns (DCAS) variable as well as the MAAS. A significant Omni $F_{(2, 124)}$ = 38.27, p<.0001, r^2=.37. The DCAS but not the MAAS was a significant predictor of the Corah Dental Anxiety-4 (t=8.44,p<.001, β=.63).

SECTION IV

DISCUSSION

Dental anxiety

This study's findings reveal that students in the overall pre-healthcare field (medicine, dentistry, pharmacy, physician's assistant, and veterinary) had significantly lower levels of dental anxiety, supporting the initial hypothesis.

There are many explanations for this result. Many of these pre-health students have been exposed to actual practice through shadowing or other personal experience. Storjord, Teodorsen, Bergdahl, and Johnsen (2014) cite that the behavior technique of *in vivo* exposure is common to treat anxiety to reduce avoidance behaviors of fearful situations and stimuli. Those who have shadowed are exposed to how various invasive procedures are performed, as well has having to see how health professionals deal with their patients worries and anxieties regarding their treatment (Storjord, Teodorsen, Bergdahl, & Johnsen, 2014).

However, not all of the students in the pre-health field have shadowed nor been exposed to situations that could be directly related to dental work and procedures. The mere expectation of working with any invasive or painful medical procedures could lead to why these pre-health students are overall less anxious. One study points that those who about to undergo surgery are significantly less anxious if they have received expectations from their physician and are more knowledgeable about their procedure (Leandro et. al, 2004). Though these patients have never had *in vivo* exposure to the surgery itself, their expectations alone were able to lower their anxiety. Overall, research is limited in showing that willingness to work in or to be exposed to

medical situations in particular could affect one's anxiety. To test this assumption, a comparison of those who are in undergraduate pre-health fields that have no *in vivo* experience could be compared to those who have this exposure, such as those in the professional school.

To further the study, each different pre-healthcare group could be evaluated separately. The results could be affected in that pre-dental students or otherwise could vary in their levels of dental anxiety. Al-Omari & Al-Omari (2009) found that current dental students (not pre) had less dental anxiety then medical students. Again, they cite that they have more specific exposure to dental procedures (2009). Even though medical students are also being exposed to similar procedures in school, they still had higher anxiety than the dental students. Additionally, certain other variables such as gender and age that have shown significant differences in other studies over dental anxiety could have potentially affected the results were not taken into account. (Appukuttan et al, 2015); (Egbor and Akpata, 2014). To further understand the types of people who are more anxious, a more extensive study should be conducted.

The DCAS and the DAS-R were employed to measure the subjects' dental anxiety. These two scales have been used in multiple studies to measure dental anxiety, but, to our knowledge, these scales have never been used simultaneously in one study. These scales were significantly related. These findings show that these scales are both effective in measuring dental anxiety and can be used together in further studies. This comparison increases the reliability and validity of these scales.

Mindfulness

Because most research shows that increasing one's level of mindfulness can lower anxiety, it was thought that those with lower levels of dental anxiety would be more mindful (Greeson, 2009). The results also show that the subjects' level of mindfulness is not significantly correlated with their dental anxiety. These results go against the initial hypothesis.

There could be several reasons for this. This study is limited in that it only dealt with one demographic variable; a more expansive study is needed to show a stronger relationship between dental anxiety and mindfulness. As previously stated, other variables, including gender and which specific professional field the subject is in (i.e. Pre-medical versus simply pre-health), were not taken into account. Examining further into these different traits could lead to a stronger correlation.

The scales used could also contribute this lack of relationship. The DCAS in particular has statements that vary in the level of severity, for example procedures relating to a simple check-up ("sound or feel of scraping during teeth cleaning" and "gagging") versus more invasive procedures and experiences ("extraction" and "panic attacks") (Clarke & Rustvold, 1993). One could also evaluate if more severe procedures, such as root canals and extractions, versus less severe procedures, such as fillings and general check-ups, alter the results. Though studies on this scale have shown it to in general predict levels of dental anxiety, perhaps there might be a more complex link to mindfulness (Clarke & Rustvold, 1993). Because the MAS has been so widely used and validated as a measure of mindfulness, it is unlikely that this survey itself is the reason for this lack of relationship (Brown & Ryan, 2003). A scale that could potentially be more accurate dealing with how much one is mindful in dental situations specifically, rather than general, everyday situations. For example, the statement "I tend to walk quickly to get where I'm going without paying attention to what I experience along to the way" could be changed to "I

tend to sit though dental procedures without paying attention to what I am experiencing" (Brown & Ryan, 2003).

Another explanation is that one's mindfulness is actually unrelated to their dental anxiety. Mindfulness is still a relatively new form of therapy and its' effectiveness has been controversial (Baer, 2003). There has been no literature regarding the specific relationship with dental anxiety; there have only been correlations between mindfulness and other types of situational anxiety. Dental anxiety is common in the population, but unfortunately is understudied in terms of treatments for this specific fear. Though mindfulness has been used to treat other anxiety disorders, this study shows that perhaps mindfulness is not linked to one's dental fear specifically. Further research should be done in a clinical setting, in which those with dental anxiety can attempt mindfulness-based therapy techniques to see if this helps them combat their fear.

SECTION V

CONCLUSION

Pre-health undergraduate college students (pre-dental, pre-medical, pre-physician's assistant, pre-veterinarian, pre-pharmacy, or pre-nursing) were shown to have lower levels of dental anxiety compared to those students not in those fields. Previous experience with shadowing dental work and/or the expectation of working in a medical-based field could explain to these results. Additionally, the subjects' level of anxiety was uncorrelated to their level of mindfulness. Though mindfulness-based interventions are increasing in use to treat anxiety and phobias, the findings here point that increasing one's mindfulness will be unrelated to their dental fear. Further research should be taken to understand if and how mindfulness-based tasks should be applied to those with dental anxiety.

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